

Spot Safety Project Evaluation

Project Log # 200611075

Spot Safety Project # 09-01-208

Spot Safety Project Evaluation of the Installation of High Intensity Signs, Guardrail Reflectors, and Additional Chevrons on the US 311 NB On-Ramp To I-40 Westbound in Forsyth County

Documents Prepared By:

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1-25-2007
Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 09-01-208 – US 311 Northbound On-Ramp to I-40 Westbound in Forsyth County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location was the installation of high intensity signs, guardrail reflectors, and additional chevrons to warn drivers of the approaching curve. US 311 is a 4-lane divided highway that currently ends at I-40 from the south. In lieu of future construction, the two northbound lanes diverge left from a tangent section at I-40 along a loop ramp onto I-40 westbound. Curve warning signs with 45-mph advisory panels and flashers are located on both sides of the northbound lanes preceding the loop ramp from a speed limit of 65-mph on US 311.

The subject location was investigated due to motorists who disregard the curve warning signs and advisory speed and enter the curve at a high rate of speed, therefore losing control of their vehicle.

The initial crash analysis was conducted from July 1, 1997 to July 1, 2000, which included 16 crashes; 14 Ran-Off-Roadway and 2 Sideswipe Crashes. All 16 crashes were deemed correctable by the countermeasure improvements including 1 “Class A” injury, 4 “Class B” injuries, and 8 “Class C” injuries.

The final completion date for the improvement at the subject intersection was on July 1, 2002 with a total cost of \$6,000.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from May 1, 2002 through August 31, 2002. The before period consisted of reported crashes from May 1, 1998 through April 30, 2002 (4 years) and the after period consisted of reported crashes from September 1, 2002 through August 31, 2006 (4 years). The ending date for this analysis was determined by the last date of available crash data at the time of this analysis.

The treatment data consisted of all crashes within the NB Ramp from the I-40 EB Ramp diverge to the joining with westbound I-40. *Please see attached location map and aerial photo for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that the all crashes located within the curve of the ramp were deemed target crashes.

These included Ran-Off-Roadway, Sideswipe-Same Roadway, and Rear-End Crashes that occurred within the mileposts of 0.52 and 0.64 of the ramp segment.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	23	28	21.74 %
Total Severity Index	2.93	9.59	227.30 %
Target Crashes (In the Curve)	14	17	21.43 %
Target Crashes Severity Index	4.17	13.40	221.34 %
Volume	9500	9500	N/A

<u>Injury Crash Summary</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal Injury Crashes	0	1	100.00 %
Class A Injury Crashes	0	1	100.00 %
Class B Injury Crashes	1	5	400.00 %
Class C Injury Crashes	5	7	40.00 %
Total Non-Fatal Crashes	23	27	17.39 %
Total Injury Crashes	6	14	133.33 %

The naive before and after analysis at the treatment location resulted in a 22 percent increase in Total Crashes, a 227 percent increase in the Total Severity Index, a 21 percent increase in Target Crashes, and a 221 percent increase Target Severity Index. The segment ADT year was 1999 and taken directly from the Project File Folder background information.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 22 percent increase in Total Crashes and a 21 percent increase in crashes that occurred within the target curve. Both the total and target severity index increased over 200 percent including 1 fatality in the after period. The summary results above demonstrate that the treatment location appears to have had an increase in both Total Crashes and Target Crashes from the before to the after period.

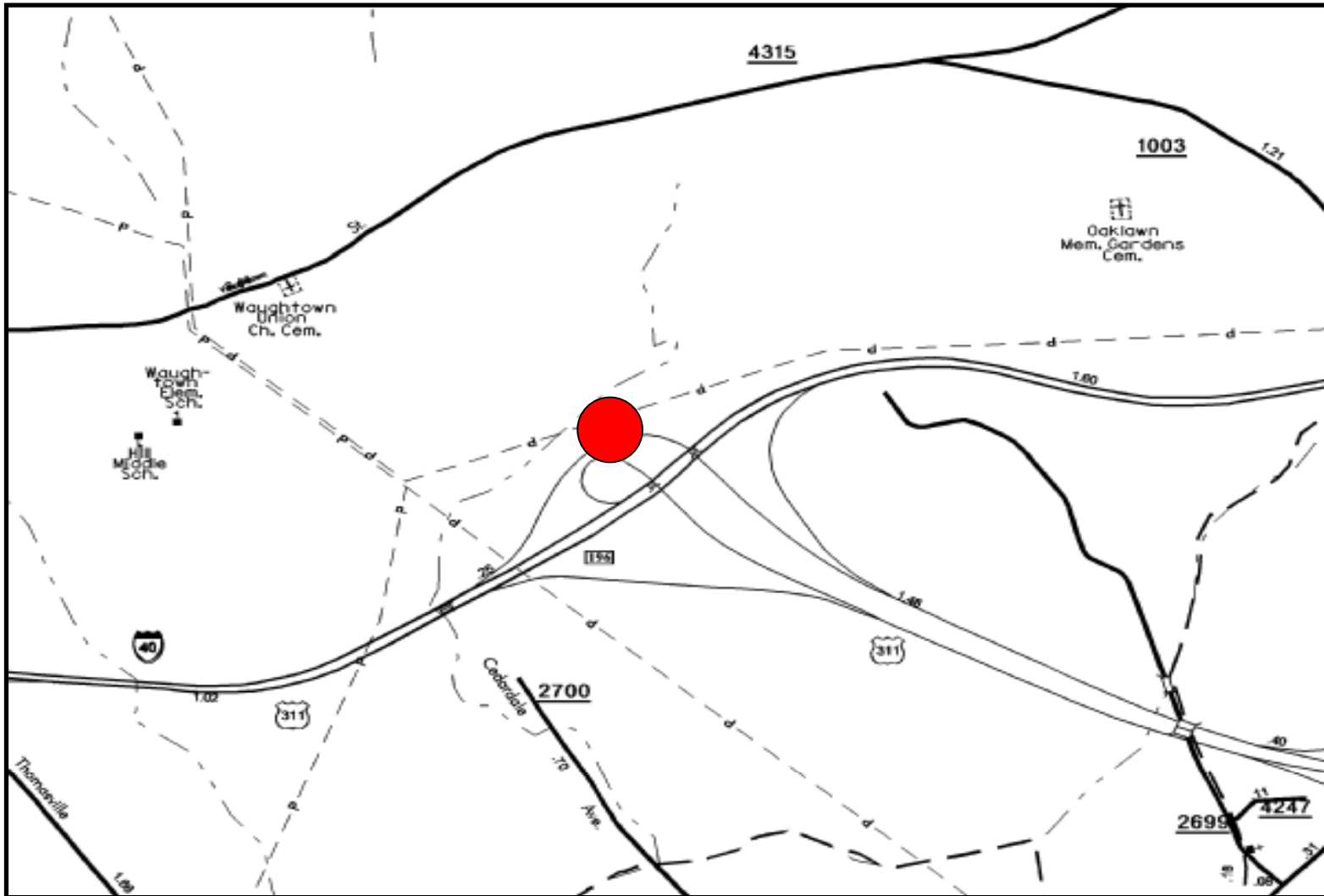
Referencing the *Collision Diagrams* and the previous tables, it appears that the countermeasure improvements made to attract the driver's attention to the curve were ineffective. The before period and after period *Collision Diagrams* show identical crash patterns to vehicles entering the left hand curve at a high rate of speed and losing control resulting in "Ran-Off Roadway" crashes with the

guardrails. There was also an increase in the number of crashes at the ramp's junction with westbound I-40 during the after period. The additional crashes appear to be weather related including hydroplaning on standing water and sliding on ice.

Again referencing the *Collision Diagrams* and the previous tables, speed continues to emerge as the rising issue. In the after period, 2 crashes occurred with impact speeds of over 80 mph. There were also 5 other crashes with impact speeds between 60 and 79 mph and two overturned tractor-trailer trucks that entered the curved ramp at an excessive speed.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Location Map
Forsyth County
Evaluation of Spot Safety Project # 09-01-208



Treatment Location: US 311 and I-40 in Winston-Salem



Treatment Site Photos Taken December 19, 2006



Start of US 311 Ramp to I-40 WB



Curve Warning Signs with Flashers and 45 Advisory Speed



Curve Warning Signs and Chevrons



View of Curve with Guardrail and Chevrons



View from Middle of Subject Curve



End of Curve / Junction with I-40 Westbound

